Data Storage

Data Storage

Punch Cards

McBee Punch Card Set, c. 1960

McBee Punch Card Set close up

McBee punch cards, also known as edge-notched cards, were a data-sorting system developed before computers. Invented in 1896, they were in common use until the 1980s. The cards, most commonly 5”x8” index cards, had holes punched in regular intervals around the edges, and you could write more information in the middle of the card. Each hole corresponded to a particular data category predetermined by the user. To indicate that the card belonged to a particular category, you extended a hole to the edge of the card, making a notch. After aligning all the cards with the help of a slanted corner on each card, you inserted a long needle into the hole representing the category that you desired. All the cards not belonging to that category would stay on the needle for you to lift away; the cards belonging to that category had notches at that spot and thus were left behind for easy retrieval. Further narrowing of the results could be performed by using another set of holes and another needle.

This punch card set was used at the National Institute of Allergy and Infectious Diseases by Drs. Joseph Bell, Robert Huebner, Robert Chanock, and Albert Kapikian to store, analyze, and collate data. They conducted many epidemiology studies at hospitals, orphanages, and prisons on viruses like influenza and hepatitis in the late 1950s and early 1960s.
[02.0021.004]

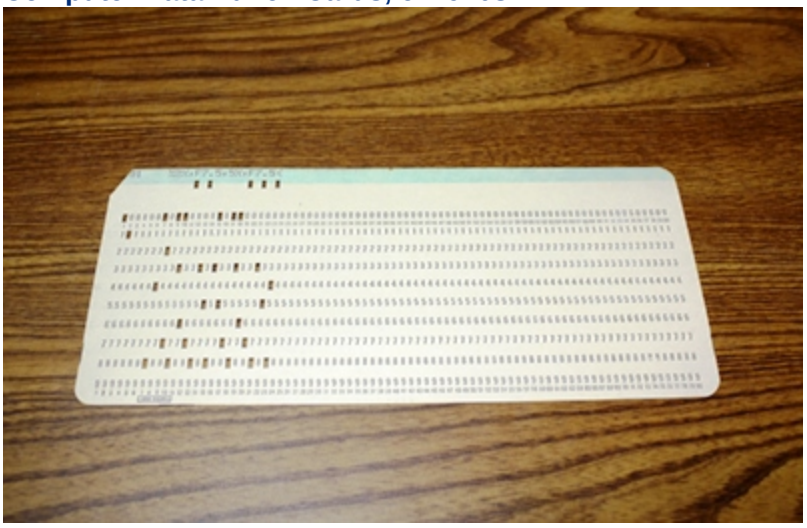
Paper tape, c. 1970


Computer Paper Data Tape

Popular in the 1960s and 1970s due to its high throughput speed and low cost, paper tape was one of the original data storage methods for computers. Information was encoded in the distinct pattern of holes punched in the paper; the paper itself was oiled to facilitate being run through the reading mechanism and to prevent tears due to brittleness. Though the paper was cheap, it had low storage capacity — only a few dozen kilobytes per roll — and the machinery involved in punching the holes was quite expensive. Higher capacity alternatives, such as magnetic tape, soon came into fashion, although use of paper tape persisted into the 1980s among some enthusiasts.

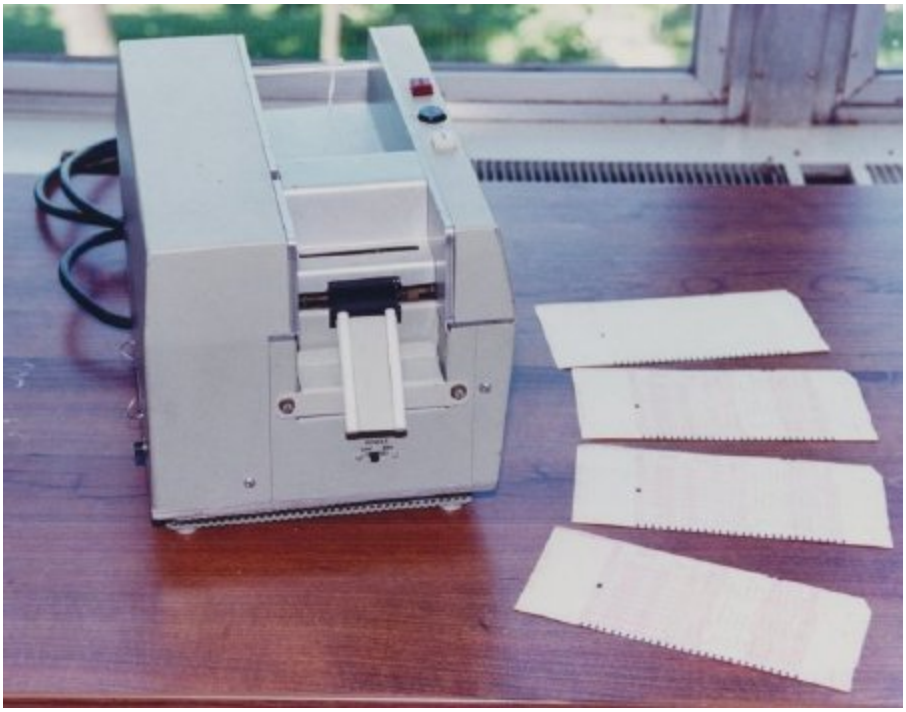
This particular paper tape was used by Dr. William A. Hagins of NIDDK to store data gathered with a thermopile on retinal function. Hagins earned a medical degree from Stanford University in 1951 and a PhD from the University of Cambridge, England in 1958. In the 1960s, his laboratory at the NIH discovered that a single photon of light disrupts the “dark current” in the retina, which in turn produces the sensation of sight in the brain.
[12.0008.004]

Computer Data Punch Cards, c. 1970s


Computer Data Punch Card

Originally invented around 1725 by Basile Bouchon and Jean-Baptiste Falcon to control textile looms, punched paper cards were the primary method of tabulated data entry, storage, and processing from the 1900s to the 1950s. Magnetic tapes became the preferred method of data storage after 1960, but punch cards were still used for data entry and programming until the mid 1980s. Herman Hollerith, founder of one of the four companies that merged to create IBM, is credited with the idea of developing machinery to read the data on a punched card and developing a system for data processing using that machinery. Upon a successful trial, the technology was then used to process data from the 1890 U.S. Census.
Unlike the McBee punch cards, data was encoded in holes punched on the entire surface of the card, rather than only around the edges. This box of punch cards from the 1970s encodes data from the experiments of Dr. William A. Hagins, National Institute of Diabetes and Digestive and Kidney Diseases. In the 1960s, Hagins’ laboratory at the NIH discovered that a single photon of light disrupts the “dark current” in the retina, which in turn produces the sensation of sight in the brain.
[12.0008.001]

Berkeley Scientific Laboratories Optical Card Reader, c. 1975


Berkeley Scientific Laboratories Optical Card Reader
This optical card reader was state-of-the-art technology in 1975. At the NIH Clinical Center research hospital, doctors used it to order lab tests with pencil-marked punch cards that were run through and “read” by the optical reader, much as one might grade a Scantron exam today. The reader then sent the order to the Clinical Center laboratories or pharmacy via a network connection. This method was a great improvement over the sometimes illegible, easily lost paper lab slips that were previously used.
[90.0004.001]

Magnetic Tape Cartridges

IBM Data Cartridge, c. 1974

IBM Data Cartridge
This small data cartridge was used in the IBM 3850 Mass Storage System, which was introduced in late 1974. The storage system combined magnetic tapes and disk drives; this cartridge contained about 770 inches of magnetic tape. Data was stored in IBM's 3336 disk pack format, which gave the tape the random access characteristics of disk drives. This cartridge could hold up to 50 million characters of information, about half of the amount stored on one disk pack.
This data cartridge was used by Dr. Robert Berger, who began his career at the NIH in 1962 in the Laboratory of Technical Development, NHLBI. Over the course of 40 years, Berger developed a number of instruments used by scientists at the NIH. He holds two U.S. patents: the first in 1988 for the computer-controlled all tantalum stopped-flow micro calorimeter; and the second in 1992 for the high-resolution digital thermometer. This thermometer could measure temperature differences to several micro-degrees centigrade and is a forerunner of the digital thermometers used today for cooking and taking temperatures.
[12.0014.001]

Graham Magnetics Epoch 480 Magnetic Media Disk, c. late 1970s

Graham Magnetics Epoch 480 Magnetic Media Disk front
This media disk, used to stored audio and visual information, has a polyurethane polymer binding system, which is tougher than tape and is able to last through one million uses. The magnetic tape made with polyurethane binder was patented by Robert J. Deffeyes on April 26, 1977, and assigned to the Graham Magnetics company (patent applied for June 16, 1976). Still unopened, it was donated to the NIH Stetten Musem by Dr. Robert L. Berger (*see above*).
[12.0014.004]

Magnetic Tape Data Cartridges, c. early 1980s

Graham Magnetics Epoch 480 Magnetic Media Disk front
The Belt Drive Tape Cartridge was patented by Robert A. Von Behren, Minnesota Mining and Manufacturing Co., filed June 17, 1971, granted September 19, 1972. The magnetic tape was driven by an elastic belt in order to minimize variations in tape tension and speed. Since their previous owner did not label them clearly, we do not know exactly what they hold, although they were probably used to store experimental data by Dr. Brian Millard. Millard, a British citizen, used mass spectrometry to study cyclic peptides and drug metabolism at the University of London and the British National Institute of Child Health. He spent a year in the U.S. at the NIH in the 1970s, from which these tapes originated.
[89.0001.015]

.3M Optimem 1000 Optical Disk Cartridge (WORM), c. 1985

3M Optimem 1000 Optical Disk Cartridge (WORM) front

In 1983, the Optimem company, an early producer of high-performance optical storage disk drives, began working with 3M Corp. to develop optical media for its product line. One of the first products produced from this collaboration was the 3M Optimem 1000, which contained 1000 MB storage capacity in a 12-inch case. It was the first in a family of optical drives using non-erasable laser technology to read and write digital data. WORM stands for “write once, read many times”; the non-erasability made the 3M Optimem 1000 ideal for backups of data that might need to be stored for long periods of time. We do not know who used this disk, or what data might be stored on it.
[12.0003.001]

Iomega Corp. Zip Disk MAC 100, c. 1994

Iomega Corp. Zip Disk MAC 100

Introduced in 1994, the Zip disk was an improvement upon floppy disks in terms of both data storage and performance. This zip disk can hold up to 100 MB of data, and later versions were able to store up to 750 MB of data. Because they required an external zip disk reader, zip disks never surpassed the popularity of floppy disks, which generally used hardware that was a standard part of commercially available computers. Although they have since been replaced by USB flash drives for everyday use, the Zip disk is still in use as a method to transfer data between modern and older technology.

This disk was used by Dr. Howard Nash, a senior investigator in the Laboratory of Molecular Biology, National Institute of Mental Health. His early investigations into the mechanisms of DNA recombination in viruses laid the foundations for modern techniques of DNA manipulation, while his later research provided insight into how genetic variation affects people's response to anesthesia.
[12.0010.004]

Optical Storage Media (Laser)

Maxell CD-R 700 MB, c. 2003

Maxell CD-R 700 MB

Offering up to 650 MB of data storage, the CD-R was a cheap and portable digital medium for backing up data. The "R" in the name stands for "Recordable", meaning that information can only be recorded once. CDs were originally developed to record music as a replacement for records; since digital music is stored in a manner very similar to that used for computer data, the CD-ROM was developed in 1985 for computer use. The first CD-recording device that cost less than $1,000 was not available until 1995, and the CD-R disks themselves were sold at a cost of nearly $4 each. Since then, prices have decreased drastically, and a DVD drive — another optical storage medium that holds six times the data of a CD — that plays CD-R (or RW, "rewritable") disks is now an integral part of personal computers.

This CD was used by Dr. James X. Yu, who is now at Yale University. He was a post-doctoral fellow under Dr. Howard Nash, National Institute of Mental Health.
[12.0010.005]